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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/609,311	06/26/2003	Donald L. Yates	M122-2236	8026

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EXAMINER

BARRECA, NICOLE M

ART UNIT PAPER NUMBER

1756

DATE MAILED: 01/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/609,311	Applicant(s) YATES, DONALD L.	
	Examiner Nicole M. Barreca	Art Unit 1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 9/6/05.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20,22-57,71 and 72 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20,22-57,71 and 72 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/15/05; 1/3/06</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's election without traverse of Group I, claims 1-57 in the reply filed on 9/6/05 is acknowledged. The applicant has canceled claims 58-70 drawn to the non-elected invention. Claims 1-20, 22-57 and 71-72 are pending in this application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-4, 7, 11-15, 18-20, 37-41, 46-50, 53-57, 71, 72 are rejected under 35 U.S.C. 102(e) as being anticipated by JP 2002-323775.

A pattern forming method for forming an undercut resist pattern shape is disclosed using a lower resist layer 2 which is relatively higher in etching rate with respect to a developer and an upper resist layer 3. The resist layers are formed over the aluminum oxide- TiC substrate (semiconducting) [0023]. The lower resist layer is applied at a thickness of 0.1 micrometer and the upper resist layer is applied at a thickness of 0.5 micrometer. The resist layers are exposed to UV rays at 172 nm [0025]-[0026]. The upper resist may be a phenol resin, such as novolak and the lower resist may be a polyimide such as PMGI [0019]. The developer is TMAH [0026]. The figures illustrate that the sidewalls of the first layer are laterally inward, curved and

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different shapes from the sidewalls of the second resist layer. The underlying layers are etched using the resist pattern layers as a mask.

4. Claims 1-4, 6, 7, 9, 11-15, 18, 20, 22-25, 28-31, 36-41, 44, 46, 47-50, 53, 55 and 71 are rejected under 35 U.S.C. 102(e) as being anticipated by Herbst (US 6,582,888).

At least two resist layers are formed on a bottom electrode which is located on a Si substrate (semiconducting). The first layer has a higher solubility rate in the liquid developer, such as TMAH, than the second layer. The first layer is composed of a varnish or positive photoresist and the second layer is composed of a positive or negative photoresist. The upper layer has a larger structure than the lower layer, producing an overhang. Example 1 teaches the lower resist layer of polyglutarimide exposed to light of 248 nm. The upper resist layer is made of novolak and exposed at light of 365 nm. Layers are deposited over the resist patterns as disclosed in the examples. See col.5, 37-55; col.6, 1-60; col.7, 51-55 and the examples in col.8-10.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 2, 6, 19-22, 34-37, 39, 40, 44, 53-56, 71, 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu (US 6,817,086) in view of Skinner (US 6,613,240).

First photoresist layer (PR1) 302 and second photoresist layer (PR2) 304 are formed of positive photoresist. Light is exposed through a mask. The wafer is then subjected to a dissolver (developer) which removes the exposed parts of the second photoresist layer. The dissolver also partially removes the first photoresist layer forming partial undercuts 310 and 312. Figure 8 illustrates the prior art process, wherein the first photoresist pattern is curved, laterally inward, and different from the pattern formed in the second photoresist. See col.6, 1-24 and Figures 7 and 8. Lu does not explicitly disclose forming the resist layer over a semiconductive substrate. The reference however teaches forming a read head and it is known in the art that read heads are conventionally formed over semiconducting substrates. Skinner teaches this in col.4, 35-55. There are many possible arrangements for forming MR sensors for read heads and all of these arrangements deposit the magnetic films on insulating, conductive or semi-conductive substrates. It would have been obvious to one of ordinary skill in the art that the resist layers could be formed over a semiconductive substrate in the method for making a read head in Lu because Skinner teaches that read heads are known in the art to be formed over such substrates.

7. Claims 5 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst as applied to claims 1 or 37 above, and further in view of Chumbres (US 3,772,101).

Herbst teaches uses positive photoresist and does not disclose using negative photoresist. Chumbres teaches that negative resist may be used instead of positive resist, if the transparent and opaque areas on the exposure mask are reversed (col.3,

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41-52). It would have been obvious to one of ordinary skill in the art to use negative resist for the first and second resist layers instead of positive in the method of Herbst because Chumbres teaches that that negative resist may be used instead of positive resist, if the transparent and opaque areas on the exposure mask are reversed.

8. Claims 8, 26, 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst as applied to claims 1, 22, 37 above, and further in view of Lammert (US 5,994,194).

The reference uses UV radiation to expose the resist and does not disclose exposing with an e-beam. Lammert teaches that conventional photoresist are hardened using either UV or e-beam exposure (col.4, 8-24). It would have been obvious to one of ordinary skill in the art to expose the resist layers in the method of Herbst to e-beam instead of UV radiation because Lammert teaches that both are known in the photolithography art to be used for photoresist exposure.

9. Claims 10, 27 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst as applied to claims 1, 22 or 37 above, and further in view of Shiihara (US 5,677,102).

Herbst is silent on the specific solvents used in the resists. Shiihara teaches that organic solvents conventionally used in positive photoresist compositions include ethyl lactate and cyclohexanone (col.4, 14-32). It would have been obvious to one of ordinary skill in the art to use ethyl lactate or cyclohexanone as the solvent in the photoresist in the method of Herbst because Shiihara teaches that these solvents are conventionally used in positive photoresists in the art.

10. Claims 13-17, 30-33, 48-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst as applied to claims 1, 22 or 37 above, and further in view of Nguyen (US 6,096,634).

Herbst teaches that the first resist layer is thinner than the second layer and less than about 50% and about 25% of the total overlying layer thickness but does not disclose that the first resist layer is less than or equal about 10% or about 5% of the total thickness. Nguyen teaches that thinner resist layers give smaller features, thereby establishing the resist layer thickness as a result-effective variable. It would within the ordinary skill of one in the art to determine the optimal resist layers thickness in the method Herbst by routine experimentation because the thickness of the resist layer is a result-effective variables, as taught by Nguyen, respectively and the discovery of an optimum value of a result effective variable is ordinary within the skill of the art, as taught by *In re Boesch*, (617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

Response to Arguments

11. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole M. Barreca whose telephone number is 571-272-1379. The examiner can normally be reached on Monday-Thursday (9AM-7PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F. Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nicole M Barreca

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Primary Examiner
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1/10/06

A handwritten signature in black ink, appearing to read "Michael B. Baker", written in a cursive style.